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ORAL DIAGNOSIS OF ABNORMAL FRENUM ATTACHMENTS IN NEONATES AND INFANTS: EVALUATION AND TREATMENT OF THE MAXILLARY FRENUM USING THE ERBIUM:YAG LASER

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Disclosure: Dr. Kotlow is a consultant and lecturer for Continuum Biomedical for which he receives lecture fees and supplies.

Introduction

The oral evaluation of children involves examination of all the soft and hard structures of the oral cavity as well as a discussion with parents regarding prevention of dental caries, diagnosis of dental disease, and methods of restoring any damage due to diet, oral hygiene, or trauma. The American Academy of Pediatric Dentistry (AAPD) states, as part of its core value assessment, that dental care for children that should be "...comprehensive and of high quality..." and continues with "...oral health is more than healthy teeth and dentists should discuss and provide anticipatory guidance regarding dental and oral development."¹

Unfortunately, specific guidelines on the evaluation and treatment of soft tissue abnormalities involving the maxillary or anterior frenum are absent in the AAPD's guidelines on *Preventive Dental Services, Anticipatory Guidance and Oral Treatment of Children*. Frenum attachments may contribute to developmental abnormalities in infants and young children, which, if intercepted early, may have beneficial effects on a variety of problems that occur in the mixed dentition stage and in the adult dentition.²

The American Academy of Pediatric Dentistry also recommends "An initial oral evaluation visit should occur within six months of the eruption of the first primary tooth and no later than 12 months of age."¹ Oral abnormalities and congenital defects that are obvious at birth or in the first three years of a child's life need to be properly detected, diagnosed, and treated. An abnormal attachment of the maxillary frenum is an oral developmental anomaly that can be diagnosed and treated in the dental office.

The anterior frenum is a combination of epithelium and loose connective tissue.³ In some instances, the frenum may include muscle fibers originating from the orbicularis oris muscle of the upper lip. The frenum may attach at variable locations in the attached gingival tissue and the anterior papillae inserting into the palate. In some instances the frenum may be completely absent. An existence of a diastema between the maxillary incisors may be a normal growth stage. Completion of the mixed dentition stage of tooth eruption often reveals that this gap closes spontaneously as the remaining anterior teeth erupt. Diagnosis and treatment of the frenum as it relates to the diastema must include such things as elimination of contributing factors such as digit habits, tongue thrusting, pacifiers, or presence of supernumerary teeth. An abnormally placed frenum may influence the growth and development of the anterior portion of the maxillary arch. When the frenum is wide and thick and causes blanching of the anterior papilla; and when the diastema is greater than 2 mm, active intervention by a frenectomy may be indicated.⁴ Historically, when a frenum revision was planned, the child was referred to an oral surgeon or an ear, nose and throat physician, who usually completed the procedure with a scalpel in a surgical suite. The treatment was often delayed or refused by parents due to the risks and costs associated with placing the child in the operating room for an elective procedure.

Treatment in the Newborn and Infant

Treatment of the frenum in the newborn or infant should be undertaken only after a careful evaluation of any potential negative effects of the frenum. Normal

tooth eruption and alveolar growth may allow for the frenum to appear to recede up the maxillary arch.

In the newborn, a tight maxillary frenum (Figure 1), alone or in conjunction with ankyloglossia, may interfere with proper latching of an infant to a mother's breast.^{5,6} The maxillary frenum may interfere with lip "flanging" and prevent nursing. This may result in the mother prematurely giving up attempts at breastfeeding. Infant oral examinations at birth may disclose a maxillary frenum attachment inserting into the alveolar ridge and in severe cases extending between the central incisors and inserting into the palate. As the infant grows, this tissue may reposition itself away from the alveolar ridge or may cause a diastema to develop between the maxillary central incisors. In other instances, the tight frenum may cause the lip to get caught between the central incisors. A tight or abnormal frenum attachment may also contribute to the failure of traumatic injuries to the area to heal, interfere with adequate oral hygiene, contribute to facial caries, restrict movement of the lip, contribute to speech abnormalities, and create undesirable esthetics in the anterior teeth. When an oral examination concludes that the frenum is a contributing cause of oral problems, early revision may prevent more serious problems from occurring at a later age.

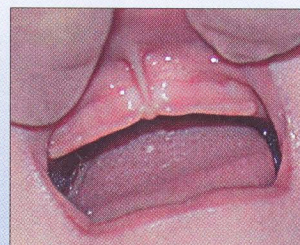


Figure 1:
Newborn frenum attachment

Classifications of the Maxillary Frenum

The following are suggested classifications the author has developed for evaluating and treating maxillary frenum attachments.⁷ These suggestions can aid in determining when revision may be of benefit for the child (Figures 2-5).

Figures 2-5: Suggested Maxillary Frenum Attachment Classifications



Figure 2:
Class I:
Normal frenum

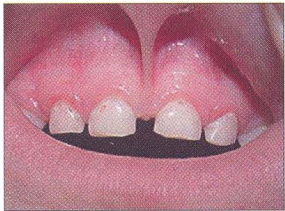


Figure 3:
Class II:
Frenum inserts
above the teeth

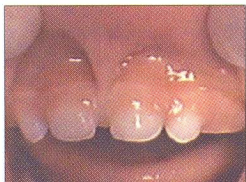


Figure 4:
Class III:
Frenum inserts
between centrals

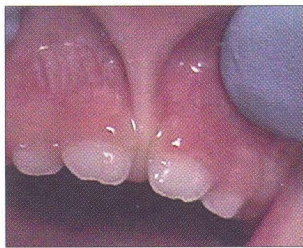


Figure 5:
Class IV:
Frenum inserts
into palate

Laser Frenectomy Technique in Infants

In infants (from birth through 2 years of age), the procedure for revising this area is simple and quick. Deciding which frenum to observe for spontaneous resolution and which will create problems is based on clinical judgment and classification of the frenum attachment. Most cases diagnosed as being Class IV will benefit from a revision. The procedure requires little cooperation from the infant, avoids general anesthesia, has no significant postoperative discomfort or complications, and is extremely safe, using an erbium laser. In cases where the frenum is not a cause of nursing difficulties, optimal closure of the diastema

appears to occur when this procedure is completed between 8-18 months of age. In newborns, the procedure can usually be completed without the use of any sedation. A small amount of topical anesthetic is applied to the mucosa. The author recommends TAC (tetracaine, adrenalin [epinephrine], cocaine) 20% (Universal Arts Pharmacy, Hialeah, Florida). A small amount of a local anesthetic agent is then injected directly into the frenum area. The procedure does not require the removal of extensive tissue.

For such cases, the author uses an Er:YAG laser, 2940 nm wavelength (DELIGHT, HOYA ConBio, Fremont, California), with parameters of 30 Hz, 95 mJ, no water, and the chisel sapphire tip. The revision takes less than 1 minute and usually does not involve a deep incision or the removal of bone (Figures 6-11). The point of the insertion of the frenum into the alveolar ridge and the area between the central incisors are lasered. The motion of the laser tip is a slow, noncontact, up-and-down movement. The palatine papilla is not involved in the treatment and should remain intact. No sutures are required. The postoperative course is usually uneventful. In most children discomfort is minimal and no more than one dose of nonprescription pain medication such as ibuprofen is usually required.

Figures 6-11: Laser Technique Demonstrated

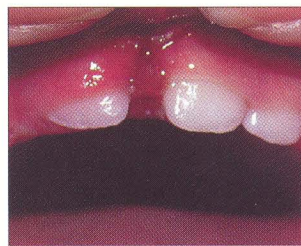


Figure 6:
One-day
postoperative view



Figure 7:
One week
postoperative



Figure 8:
Six months
postoperative



Figure 9:
Sapphire chisel
laser tip positioned



Figure 10:
Noncontact lasing



Figure 11:
Immediately
postoperative view

Revision in the Mixed Dentition Stage

Closing the diastema through the use of a removable orthodontic appliance may result in unacceptable tipping of the central incisors. Banded orthodontics treatment may not be required if the revision is completed during the early mixed dentition stage of dental eruption.

In the mixed dentition, in addition to soft tissue revision, the procedure may require the lasering of bone between the two maxillary central incisors. In the author's experience, the optimal time to revise the frenum, if it is not done in the early primary dentition, is when the two central incisors have erupted about 2-3 mm. At this time, the normal mesial eruption of the central incisors as well as the eruption of the lateral incisors assists in closing the diastema without the need for orthodontic therapy. Various orthodontic texts and authors suggest that frenum revision results in scar formation^{8,9}. In the author's experience, after performing more than 2000 maxillary frenectomies during a 25-year period, no adverse scar formation has been observed. In older children, the author recommends that the frenectomy procedure be completed prior to initiation of orthodontics. If the diastema is the only malocclusion problem, once the revision is completed, spontaneous closure of gaps exceeding 5 mm can be observed.

Laser settings are similar to the settings discussed in treatment of the infant frenectomy (30 Hz / 95 mJ, no water, using the chisel tip). Lasing should be noncontact, keeping the laser tip about 1-2 mm off the tissue. The procedure in noncontact mode will usually control and limit any bleeding to a minimum and is similar to a dermabrasion process. The erbium laser energy is selectively absorbed by water and organic components which are vaporized by the thermal effect. This allows removal of tissue without significant collateral damage.

Small layers of tissue are removed until the frenum releases. Deep cutting of transseptal fibers down to bone is usually not needed or desirable (Figures 12-19). Extension into the palatine papilla is not necessary and should be avoided. Early revision of the maxillary frenum may allow complete closure of a diastema and usually eliminates the need for retention that follows orthodontic treatment for diastema closure after the eruption of all permanent teeth.

Postoperative Directions

Directions to parents for postoperative care of the revision include:

1. Pain medication such as ibuprofen can be given after the local anesthetic wears away, as required if a child experiences discomfort.
2. If bleeding occurs, place pressure with small gauze pad or place a moist teabag over the area for five minutes.
3. Brush the area gently beginning that evening.
4. Pull the lip up a few times daily for a week to prevent primary healing of the area revised by the laser.
5. Return in 6 days for a postoperative evaluation.

Conclusion

The existence of a maxillary diastema may be a common occurrence and self-correcting in infants, and after completion of

the eruption of all permanent teeth in older children. If a clinical examination in a newborn reveals a tight maxillary frenum, and a mother is having difficulty nursing the child, a maxillary frenum release may improve the infant's latching ability. In children where the maxillary central incisors have erupted and a gap exceeding 2 mm exists, the frenum may act as an interfering attachment to closure of the diastema. Upon completion of the oral examination, a frenectomy may be indicated. This procedure may prevent the need for orthodontics in the mixed or permanent dentition. Revision in children may also eliminate the need to revise the frenum in adulthood where the frenum may contribute to periodontal disease or esthetic considerations. ✦

References

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Figures 12-19: Revision in the mixed dentition

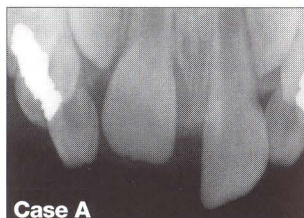


Figure 12:
Preoperative X-ray

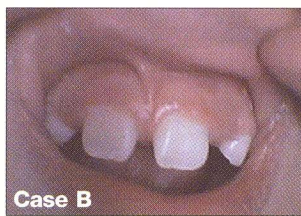


Figure 16:
Preoperative view

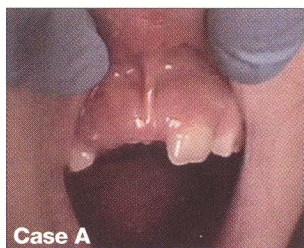


Figure 13:
Preoperative view

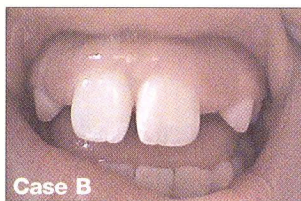


Figure 17:
Six month
postoperative



Figure 14:
Immediately post-
operative view

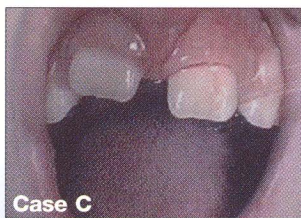


Figure 18:
Preoperative view

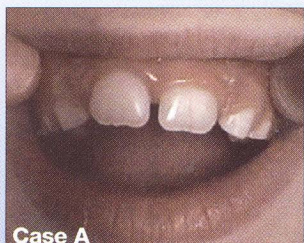


Figure 15:
One year
postoperative



Figure 19:
One year
postoperative